

SURVEY
OF
EIGHT SEWAGE TREATMENT PLANTS
IN
THE STATE OF MICHIGAN

Division of Plant Operations

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FEB 25 1966

ONTARIO WATER
RESOURCES COMMISSION

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TABLE OF CONTENTS

Preamble	Page 1
Sampling and Laboratory Control.....	Page 4
Staffing	Page 8
Maintenance	Page 11
Salary Differentials	Page 13
Sludge Handling Facilities	Page 20
Supplementary Equipment	Page 21
Conclusions	Page 23
Recommendations	Page 24

APPENDIX

Preamble

Many operating procedures have become standardized at Ontario Water Resources Commission plants during the years these plants have been in operation. It was realized that a comparison of these procedures with those of plants operated by others was desirable. As a result, plants operated in Ontario by municipalities and plants in the State of Michigan were visited by Mr. A. Beattie and Mr. D. McFavish respectively. This report pertains to the survey of Michigan operated plants.

Eight municipally operated plants in the State of Michigan were surveyed and the results of this survey are contained in this report. Staffing practices, laboratory controls, equipment provided, sludge handling facilities and maintenance policies are considered in the report.

In general, it was found that laboratory control of the process is quite extensive and consistent. Most of the plants attempt BOD and suspended solids sampling on a seven day per week basis. All of the tests are performed at the plant and most of the laboratory work is performed by one person.

Maintenance of buildings, grounds and equipment was found not to be consistent. Many plants fall short of the standards of maintenance found at OWRC plants and some exceed them. Whereas, OWRC plants stress maintenance and rely on plant design, the operator and infrequent sampling for process control, the plants in Michigan stress laboratory control of the process and rely on the operator and municipality to provide proper maintenance.

The licencing program in Michigan has provided highly trained and highly qualified operators, from a process control point of view, in particular. These operators have a higher formal education than OWRC operators, on the average, since formal education is one of the requirements for the various licences.

The size of staffs employed at the plants surveyed compared favourably with those at OWRC plants. Some are larger than OWRC staffs, but incineration is practised at those plants. Salaries for plant operating personnel in Michigan exceed those of OWRC plants by as much as fifty to one-hundred percent. In addition, the differential between the various line functions is greater and more consistent than those found here.

The information gained from the survey of the Michigan plants is, in portions of the report, compared with data from OWRC plants. These comparisons and comparisons with other plants will prove useful in planning changes or new procedures in our policies.

Sampling and Laboratory Control

Process control, through the facility of laboratory analysis, was found to be quite extensive at all of the plants visited. This has, undoubtedly, resulted from the emphasis which is placed on laboratory control by the Michigan Department of Health through its operator licencing program and its operation report requirements.

The licencing program requires a candidate to be familiar with laboratory tests and the interpretation of same. As a result, persons who obtain a licence become, if they are not already, laboratory and process orientated. In addition, since licenced people are much in demand, it is usual for the superintendent to be the one licenced and his influence assures good process control through laboratory analysis.

Report forms are supplied to all plants by the Michigan Department of Health and these forms emphasize the importance of laboratory determinations. Copies of blank forms are appended. In addition to the tabular data each plant is encouraged to submit probability plots of BOD, suspended solids, flow and other operating data.

All of the laboratory tests referred to in the accompanying tables are performed at the plant. In the plants with design flows below 2 MGD these tests are performed by the superintendent. In the larger plants the tests are performed by a chemist. At the Wyandotte (52 MGD) and Pontiac (152 MGD) plants more than one man is utilized in the laboratory. However, at the Jackson (15.8 MGD), Port Huron (11.2 MGD) and Ann Arbor (12.5 MGD) plants one man performs all of the tests and at these plants samples are collected seven days per week (Jackson 6 days).

In addition to using information derived from laboratory analysis for the Michigan Department of Health reports and plant control, many of the superintendents performed materials balances throughout the process, e.g. the pounds of solids removed by the plant are compared to the pounds of sludge solids removed by truck. As a result of the good information which has been obtained from laboratory tests, they are able to have balances better than 10 percent (many are closer to 3 percent). This serves, not only as a check on meters and laboratory analysis, but as an audit or balance sheet for the plants operation.

A summary of the samples taken at the various plants visited is given in the following tables.

PLANT		SEWAGE SAMPLES				
		BOD and S.S. Analysis				Bacti samples days/Wk.
		Composite	Prop. to Flow	Hours	Days/Wk.	
Design Capacity	Name					
0.42	Utica	x	x	24	3	3
1.86	Trenton	x	x	12	6	3
0.21	Almont	x	x	8	3	-
**15.2	Pontiac	x	x	24	7	-
11.2	Port Huron	x	x	24	7	periodically
15.8	*Jackson	x	x	24	6	7(city lab)
52	Wyandotte	x	x	24	7	7
12.5	Ann Arbor	x	x	24	7	7 (Grab)

* Attempt to have a coliform count less than 5,000
95 percent of the time.

** Total capacity of 2 plants

PLANT	S L U D G E S A M P L E S (% Solids)						
	Compo- site	Grab	Days Per Week		Filter- ed	Fil- trate	Super- natant
			Raw	Digest- ed			
0.42 Utica	x		5	1			when removing 5
1.86 Trenton	x		6		6	6	
0.21 Almont	x		3	3			when removing
**15.2*Pontiac	x		7	7	7	7	7 7
11.2 Port Huron	x		7	7			7
15.8*Jackson	x		7	7			7 7
52 Wyandotte	x		7		7	7	
12.5*Ann Arbor		x	7	7	7	7	7 7

* Compositied over 24 hours

**Total capacity of 2 plants

PLANT	ADDITIONAL SAMPLES
0.42 Utica	Volatile solids (1/wk), volatile acids (1/wk.)
1.86 Trenton	Volatile solids (1/wk), Cyanide (1/wk), Chrome (1/wk), Grease (1/wk)
0.21 Almont	Volatile solids (3/wk)
**15.2 Pontiac	Chrome (7/wk), Cyanide (7/wk), Volatile solids (7/wk), Cl ₂ residual every hour
11.2 Port Huron	Volatile acids (7/wk)
15.8 Jackson	Cyanide (7/wk), Chrome (7/wk), Alkalinity (7/wk), Volatile solids (7/wk), Sp.Gravity (7/wk), CO ₂ (7/wk.)
52 Wyandotte	Volatile solids, Industrial wastes(periodically)
12.5 Ann Arbor	COD(7/wk),Volatile acids(7/wk),Volatile solids(7/wk)

** Total Capacity of 2 plants

Staffing

The Michigan Department of Health initiated a licencing program for sewage plant operators during the 1950's. Through this program every treatment plant is classified as to the calibre of operator required for its operation. This classification makes it mandatory for each plant to have at least one person on staff who holds a licence which agrees with the classification of the plant, i.e. if the Michigan Board of Health classifies the plant as one requiring an operator with a Class A licence then one man on staff at the plant must possess such a licence. The plant classification is based upon population and type of process. Four classifications ranging from A to D are employed.

At all the plants visited, the person holding the highest licence was superintendent.

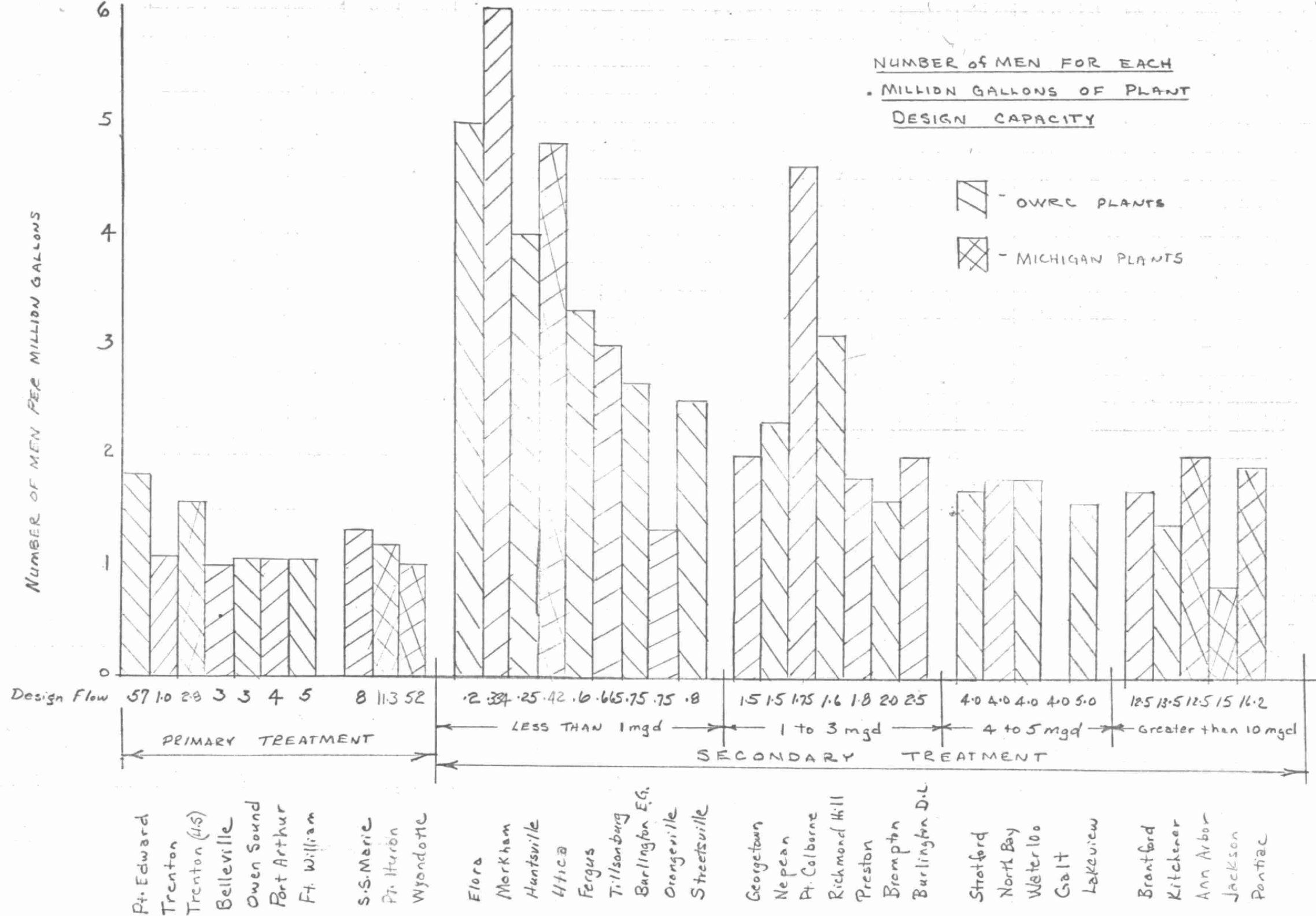
The remaining members of staff were hired for their mechanical or electrical skills in much the same fashion as those engaged for OWRC plants.

The following graph illustrates the number of men per million gallons at OWRC and Michigan plants. In general, there is agreement. However, due to the practise of incineration, the man power requirements at some of the Michigan plants does slightly exceed those at OWRC plants.

NUMBER OF MEN PER MILLION GALLONS

NUMBER OF MEN FOR EACH
MILLION GALLONS OF PLANT
DESIGN CAPACITY

OWRC PLANTS
MICHIGAN PLANTS



Hours of Supervision:-

All of the plants, with the exception of Trenton (1.86 MGD), Almont (0.21 MGD) and Utica (0.42 MGD) were supervised 24 hours per day. The plants receiving the twenty-four hour coverage ranged in size from 12.5 to 52 MGD. The five plants with 24 hour supervision maintained, as a rule, more than one man on each shift. The Jackson plant, however, had only one man on the afternoon shift, and one man on the night shift. The Port Huron plant had its shift schedule arranged so that there was only one man at the plant from 5 p.m. to 8 p.m. and from 4:30 a.m. to 7 a.m. The remainder of the time there was more than one man at the plant.

As a safety precaution, the operator on shift at the Jackson plant during either the afternoon or night shift telephoned the operator on duty at the water treatment plant. These calls were placed each hour and if one operator did not obtain an answer from the other, he would telephone the police. It was reported that it had not been necessary to date to telephone the police.

Organization:-

The organizations of the plant staffs are similar to those used in OWRC plants. In the larger plants, as

here, the organization was usually a functional one.
Organization charts for the various plants are included
in the Plant Survey Sheets which are appended.

Maintenance

The Michigan Department of Health stresses process control and the importance of a good quality effluent. The standard of operation from the process point of view is quite high and consistent. The quality of the maintenance of equipment, building and grounds, however, is not as consistent. The quality of maintenance varies from plant to plant and depends upon the interests of the respective superintendent and possibly the municipality in which the plant is located.

The following table compares maintenance at the Michigan plants with the average condition at OWRC plants.

P L A N T			M A I N T E N A N C E		
Name	Des.Cap.	#of Men	Building	Grounds	Equipment
Utica	0.42	2	B	B	C
Trenton	1.86	3	B	C	B
Almont	0.21	1	A	B	A
Pontiac	15.2	32	B	B	B
Port Huron	11.2	13	B	B	A
Jackson	15.8	11	B	A	A
Wyandotte	52	51	C	C	B
**Ann Arbor	12.5	25	D	D	C

** - plant enlargement in progress at time of visit.

* - B - average standard of maintenance at OWRC plants.

It should be noted that there is not a correlation between the man power and the quality of maintenance. The highest calibre of all round maintenance was found at the Jackson plant where only 11 men were employed (plant capacity 15.8 MGD).

The staffs involved with maintenance at the large plants are as follows:

- Wyandotte (52 MGD) - 3 mechanics, 1 electrician, 2 groundsman and 2 labourers.
- Pontiac (15.2 MGD) - 2 mechanics and 2 labourers.
- Port Huron (11.2 MGD)- 1 mechanic and 1 labourer part-time.
- Ann Arbor (12.5 MGD) - 1 mechanic and 2 labourers part-time.
- Jackson (15.8 MGD) - 2 maintenance mechanics.

Salary Differentials

The salary levels for operators in Michigan and superintendents in particular are much higher than those for equivalent positions in the OWRC (50 to 100 percent in many instances). However, with respect to the superintendents, it should be noted that these men have, in general, higher qualifications than their counterpart in the OWRC. Many have a partial or complete college education. The Class A licence holder is required to have completed some college courses.

Although a comparison of the absolute salaries at Michigan plants and OWRC plants may not be of great value, it is of interest to note the salary differentials which exist for the various positions at plants. The following tables list salary differentials at Michigan and OWRC plants. The graph comparing the average salary of level II as a percent of level I for OWRC and Michigan plants illustrates that there is a greater pay differential, between the superintendent level and the next lower level, at Michigan plants than at OWRC plants.

Salary Differentials - Michigan

Position	SALARY AS A % OF SUPERINTENDENT'S SALARY						
	Primary Plants			Secondary Plants			
	Trenton (2.8)	Pt. Huron (11.3)	Wyandotte (52)	Utica (.42)	Ann Arbor (12.5)	Jackson (15)	Pontiac (16.2)
Superintendent	100	100	100	100	100	100	100
Asst. Superintendent			86		82.5	68	84
Supervisor		74	74				
Chemist III			67		61.5	63	72
Chief Operator					61.5		
Shift Supervisor			57				69
Master Mechanic					61.5		
Senior Mnte. Mechanic						63	
Mechanic						59	64
Senior Shift Operator					55.5		
Plant Operator I							
Plant Operator II			53				
Plant Operator III			46				
Operator	86	61				60	63
Pumping Station maintenance		60					
Lab. Assistant							58
Heavy Eq. Operator							51
Truck Driver						54	
Labourer II		55					49
Labourer I		51					44
Labourer			44		43.6		
Clerk-Typist		55					39

Salary Differentials - Michigan

The salary levels for the "in-line" positions expressed as a percent of the superintendents salary were as follows:

Level	SALARY AS A % OF SUPERINTENDENT'S SALARY							
	Primary Plants			Secondary Plants				Avg. Range
	Trenton (2.8)	Pt. Huron (11.3)	Wyandotte (52)	Ann Arbor (12.5)	Jackson (15)	Pontiac (16.2)		
Level I (Supt.)	100	100	100	100	100	100	100	68-86
Level II	86	74	86	82.5	68	84	80	60-74
Level III		61	74	61.5	60	69	65	55.5-63
Level IV			57	55.5		63	58	-
Level V			53				53	-

NOTE: - lowest level shown is that of operator.

The salaries of the various levels as a percent increase from the previous salary levels are as follows:
(average)

Level I	-	25%
Level II	-	23%
Level III	-	12%
Level IV	-	10%
Level V	-	---

The plant operator level's salary as a percent increase over the labourer rate for the various plants visited were as follows:

Port Huron	-	20%
Wyandotte	-	20%
Ann Arbor	-	24%
Jackson	-	11% (truck driver lowest level - no labour)
Pontiac	-	<u>30%</u>
Avg.		21%
Range		11 to 30%

SALARY AS A PERCENT OF SUPERINTENDENTS SALARY - OMRC PLANTS

PROJECT	SUPT.	ASST. SUPT.	SENIOR OPERATOR	SHIFT FOREMAN	LEAD OPERATOR	FILTER OPERATOR	OPERATOR	MAINTENANCE FOREMAN	MAINTENANCE TECHNICIAN	LAB. TECHNICIAN	MAINTENANCE OR ELECTRICAL OPERATOR	LEAD GROUNDS-KEEPER	CLERK	GROUNDS-KEEPER	LABOURER
BRAMPTON	100						88								
BURLINGTON	100		87				78								
FT. ERIE	100						84								
FT. FRANCIS	100						88								
FT. WILLIAM	100						82								
GALT	100						88							79	
GEORGETOWN	100						88								
KITCHENER	100	87			76		73	83	76	79		67			
LAKEVIEW	100						70		79					64	61
MARKHAM TWP.	100						88								
PT. ARTHUR	100						88								
PT. COLBORNE	100						84		87	84					
PRESTON	100						80								
RICHMOND HILL	100						84								
SAULT STE. MARIE	100					76	73		74					70	
SUDBURY	100						73								
TIMMINS	100														
UNION	100	83					67		70					61	
BRANTFORD	100	83		80		70	70	80	76	73			68	68	
BELLEVILLE	100						84								
DUNNVILLE	100	80					67								
GODERICH	100	91					88								
FERGUS	100						81								
NEPEAN TWP.	100						78								
NORTH BAY	100						77				84				

CONT'D

PROJECT	SUPT.	ASST. SUPT.	SENIOR OPER- ATOR	SHIFT FORE- MAN	LEAD OP- ERATOR	OPERATOR	MAINTENANCE FOREMAN	MAINTENANCE TECHNICIAN	LAB. TECH- NICIAN	MAINTENANCE OR ELECTRICAL OP- ERATOR	LEAD GROUNDS- KEEPER	CLERK	GROUNDS- KEEPER	LABOURER
OWEN SOUND	100					81								
STRATFORD	100	84				80								
TILLSONBURG	100					91								
SIMCOE	100					84								
BERTIE TWP.	100					84								
WATERLOO	100					77		80						

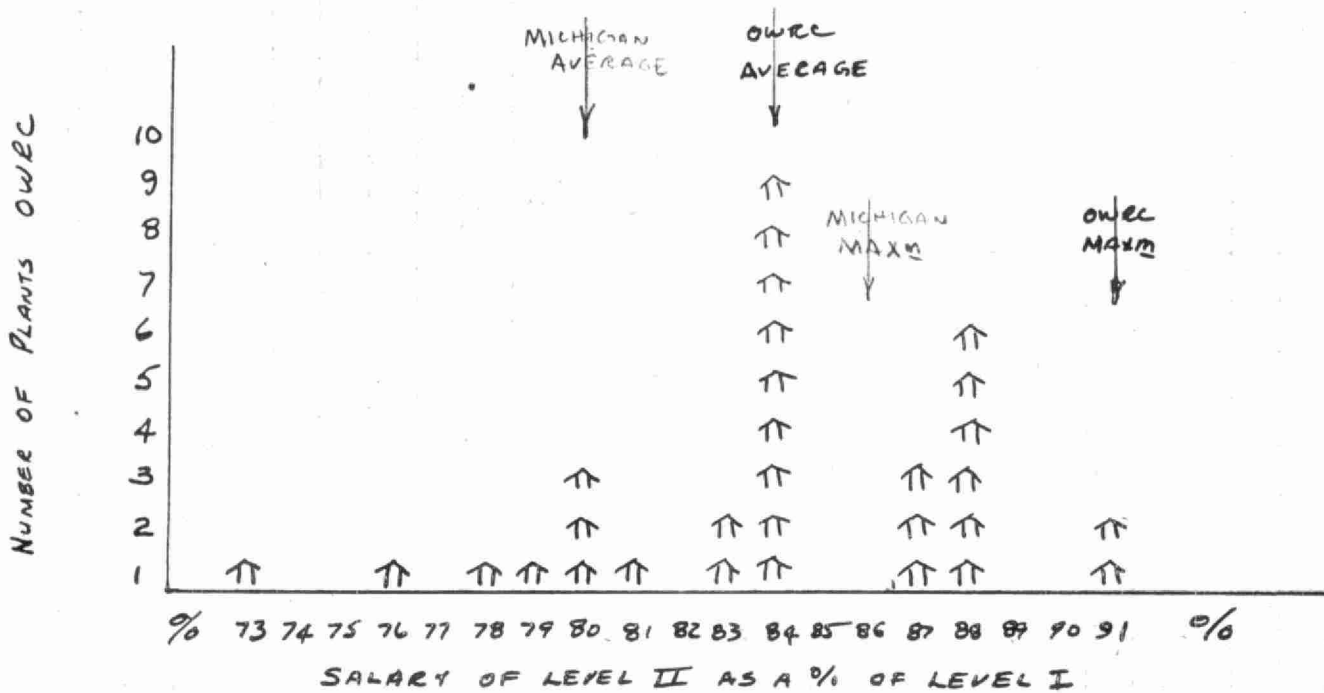
Salary as a Percent of Superintendents Salary -
OWRC Plants

PROJECT	LEVEL I	LEVEL II	LEVEL III	LEVEL IV
Brampton	100	88		
Burlington	100	87	78	
Fort Erie	100	84		
Fort Francis	100	88		
Fort William	100	84		
Galt	100	88		
Georgetown	100	88		
Kitchener	100	87	76	73
Lakeview	100	79		
Markham Twp.	100	88		
Port Arthur	100	88		
Port Colborne	100	87		
Preston	100	80		
Richmond Hill	100	84		
Sault Ste. Marie	100	76		
Sudbury	100	73		
Union	100	83	67	
Brantford	100	83	80	70
Belleville	100	84		
Dunnville	100	80	67	
Goderich	100	91		

cont'd

PROJECT	LEVEL I	LEVEL II	LEVEL III	LEVEL IV
Fergus	100	81		
Nepean Twp.	100	78		
North Bay	100	84		
Owen Sound	100	84		
Stratford	100	84		
Tillsonburg	100	91		
Simcoe	100	84		
Bertie Twp.	100	84		
Waterloo	100	80		
Avg:		84	74	71.5
Range:		73-91	67-80	70-73

COMPARISON OF SALARY DIFFERENTIALS BETWEEN LEVEL I & LEVEL II MICHIGAN & OWRC PLANTS



NOTE:

- AT 91% - Tillsonburg
- Goderich
- AT 73% - Sudbury
- AT 76% - S.S. Marie

Sludge Handling Facilities

Various sludge handling techniques are employed at the Michigan plants. Unlike OWRC plants, incineration was practised at the larger plants. A summary of the facilities used at these plants is as follows:

PLANT		SLUDGE HANDLING FACILITIES					
Name	Capacity	Thickening Tank	Vacuum Filter	Digester	Sand Beds	Hauling	Incineration
Utica	0.42			2-stage	yes	yes	
Trenton	1.86	2,15ft.deep rectangular	2, polymers				sludge & garbage
Almont	0.21			1-stage	yes		
Pontiac	15.2		2	2-stage	Emergency		yes
Port Huron	11.2		Emergency	4-single stage	yes (glass)	yes	
Jackson	15.8			2-stage	yes	yes	
Wyandotte	52	yes	1-500ft. ² unit				2-units
Ann Arbor	12.5		4-units	2-stage			2-units

All plants employing incineration disposed of the ash by placing it in lagoons.

Supplementary Equipment

Information regarding equipment supplied to the plants, other than the normal hand tools and laboratory equipment, was noted. A summary of the equipment provided for the various plants is as follows:

Plant		TRUCKS		Auto	Welder	Trac- tor	Riding Mower	Other
		Pick- up	Stake					
Utica	0.42 mgd	1	-	-	-	-	-	2-samplers*
Trenton	1.86 "	1	1	-	1	1	1	-
Almont	0.21 "	-	-	-	-	-	-	-
Pontiac	15.2 "	4	1	1	2	2	3	8-samplers
Pt. Huron	11.2 "	2	2	-	2	1	3	-
Jackson	15.8 "	2	2	-	1	1	-	2-samplers
Wyandotte	52 "	2	2	-	1	-	-	-
Ann Arbor	12.5 "	1	1	1	1	1	2	-

* Sampler - automatic samplers

In the past, equipment similar to what is listed above has not been supplied to the same extent as indicated in the table. However, there has been a tendency recently to supply more equipment of this type at OWRC plants. Casual observation of the Michigan plants

indicated that some were probably over supplied with some of the supplementary equipment but that this equipment did facilitate efficient operation, with respect to self-sufficiency and staff moral, e.g. the operators appreciated being able to use a plant vehicle to move a pump or sampler rather than an operator's car.

Conclusions

1. The salaries for equivalent positions at Michigan plants are much higher than those at OWRC plants.
2. The licencing program of the Michigan Board of Health has produced superintendents of high calibre with respect to process. The superintendents are most concerned with the protection of receiving streams and to this end are highly laboratory oriented. From this point of view they are more qualified than OWRC superintendents.
3. Sampling programs are much more comprehensive and sophisticated than those followed at OWRC plants.
4. Salary differentials between a higher and the next lower level are greater at Michigan plants.
5. The staffing of plants in Michigan and at OWRC plants is comparable.
6. There is a tendency for more persons to be involved with maintenance and less with process control at OWRC plants.

Recommendations

1. The Division of Plant Operations should review its sampling and laboratory control program. Consideration should be given to the provision of laboratory equipment at remote plants in particular.
2. In conjunction with the findings at Michigan and comments raised at the 1965 Chief Operators Conference, the salary differentials established at OWRC plants should be reviewed.
3. In order to improve process control, more emphasis should be placed on obtaining experienced men and men with high qualifications for the larger plants. Raising the calibre of the superintendents will raise the standard of plant operation.
4. As a result of the comparison of treatment results at various OWRC plants and also this survey of Michigan plants, more emphasis should be placed on process control.
5. Surveys and inspections of plants other than those operated by the OWRC should be performed. The experiences and knowledge of other groups will prove invaluable in improving the functions of this Division and the operation of OWRC plants. It is recommended that visits be made to plants located in the States bordering or lying close to Ontario. Plants should be selected on the basis of size, type of process and similarity to OWRC plants.

Prepared by:

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D. A. McTavish, P. Eng.,
Regional Supervisor,
Division of Plant Operations.

DMCT:sm

A P P E N D I X

OPERATION REPORT of SEWAGE TREATMENT PLANT FOR _____, MICHIGAN

MONTH _____ 19____ ACTIVATED SLUDGE DATA OPERATOR _____

Date	Air Applied		5-Day B O D		Suspended Solids		Susp. Vol. Solids		Removed		D.O.	Mixed Liquor			Return Sludge		Waste Sludge	Remarks			
	Hrs.	CFM	cf./lb. B.O.D. Rem	Pri. Eff.	Final Eff.	Final Eff.		Final Eff.		Total Plant		Final Eff. Mg/l	Susp. Solids	Settl. 30 Min.	Sludge Density Index	D.O. Mg/l	%		S.S. Mg/l	1000 Gals.	
				lbs./Day/ 1000 c.f. of tank	Mg/l	Lbs.	Mg/l	Lbs.	Mg/l	Lbs.	BOD										S.S.
				%	%	%	%	%	%	%	%										%
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Sheet No. 2 of 3

Municipality (City or Town)

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D-3
Sheet No. 3 of 3

Municipality (City or Town)

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OPERATION REPORT of SEWAGE TREATMENT PLANT FOR

_____, MICHIGAN

D-4
MICHIGAN DEPARTMENT OF HEALTH

MONTH _____ 19____

MISCELLANEOUS DATA

OPERATOR _____

Date	Weather			Type*	Raw Sewage			Grit cf/mg	Plant Eff. E. Coll. MPN/100ml.	Cl ₂ lbs.	Power KWH	AUX. FUEL • •	Remarks
	Precip.	Temp. (*F)			Temp.	Flow	pH						
	Inches	Max.	Min.		*F	MGD							
1													
2													
3													
4													
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ARITH. MEAN

STAT.

*C—Clear

W—Windy

CL—Cloudy

CA—Calm

R—Rain

S—Snow

**Indicate Unit

OPERATION REPORT of SEWAGE TREATMENT PLANT FOR

_____, MICHIGAN

MONTH _____ 19____

VACUUM FILTER & INCINERATION DATA

OPERATOR _____

Date	Sludge to Filter			Chemicals to Filter				Filter		Filtrate				Filter Cake			Incineration				Remarks	
	Gal.	Tot. Sol. %	Lbs. Dry Sol.	pH	CaO		FeCl ₃		Tot. Hours	Yield	Gal.	pH	Sus. Solids Mg/l	Vol. Susp. Solids %	5 Day Bod Mg/l	Thou. Lbs. Wet	Tot. Sol. %	Vol. Sol. %	Hrs. Opr.	Yield ***		Fuel BTU
					Lbs. Dry	R	Lbs. Dry	R														
	1	2	3	4	5	*6	7	*8	9	**10	11	12	13	14	15	16	17	18	19	20	21	22
1																						
2																						*R = $\frac{\text{chem. dosage}}{\text{dry solids}} \times 100$
3																						**lbs. of dry sludge (applied col. 3)
4																						$\frac{\text{sq. ft.} \times \text{hours}}$
5																						
6																						
7																						
8																						*** (at specified sludge dry solids content)
9																						
10																						Mult. Hearth—lbs. of wet sludge per hour per sq. ft. of heating surface.
11																						
12																						
13																						Flash Dryer— lbs. of wet sludge per cu. ft. of combustion chamber.
14																						
15																						
16																						
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TOTALS

ARITH.

MEAN

STAT.

MEAN

SIGMA

$$*R = \frac{\text{chem. dosage}}{\text{dry solids}} \times 100$$

$$**\text{lbs. of dry sludge (applied col. 3)} \\ \text{sq. ft.} \times \text{hours}$$

*** (at specified
sludge dry solids content)

Mult. Hearth—lbs. of wet sludge
per hour per sq. ft. of heating
surface.

Flash Dryer— lbs. of wet sludge
per cu. ft. of combustion cham-
ber.

SOLIDS BALANCE REPORT - PRIMARY SEDIMENTATION TANK OPERATION

MICHIGAN

MONTH _____, 196____

OPERATOR _____

[illegible]

PLANT SURVEY MICHIGAN

MARCH 1965
PI

PROJECT	UTICA	ALMONT
TYPE	ACTIVATED SLUDGE	TRICKLING FILTER
DESIGN FLOW	0.42 MGD AVE. 1.25 MAX	0.21 MGD AVE. , 0.5 MGD Max.
ACTUAL FLOW	0.33 MGD.	0.08 MGD
SIZE OF GRDS.	3 Acres	1 acre
NO. OF BLDGS.	1 MAIN BLDG. (FERGUS)	1 Bldg. (FRANKFORD)
TREATMENT UNITS.		
OFF SITE P.S.(S)	1 - SMITH & LOVELL (In a school)	1 - Package
ON SITE P.S.(S)	1 (20.02 mgd and 1 - 0.42 mgd)	Pumped at plant
PRIM. CLARIFIERS	2 - Tanks	1 - tank
MECH. AERATION		
DIFF. AIR	Sparjers	
TYPE OF PROC.	Conventional	
DIGESTERS P.	1 - Square	1 - heated
S.	1 - Square	
VAC. FILTER	NIL	
SLUDGE INC.	NIL	
HAULAGE	NOT TET	
OTHER SLUDGE	DRYING BEDS	Sludge drying beds.
FACILITIES		
REMARKS	CHLORINE YEAR ROUND (25 lbs/day = 6 ppm)	Very well maintained
STAFF - NO. OF MEN	2	1 - part time help by Town
HRS. SUPER.	8 hrs./day for 5 days	Employee on weekends \$20/hr.
SHIFT SCHEDULE	4 hrs/day for Sat. & Sun.	Town will help on 2 man jobs.
No. Op. /SHIFT A	YES	8 hrs/day 5 days
A.	NIL	1 hr/day on weekends.
N.	NIL	
QUALIFICATIONS	CLASS B.	CLASS C
ORGANIZATION & SALARIES	SUPERINTENDENT \$6800 OPERATOR ?	CHIEF \$6200

PROJECT	UTICA	ALBANY
FRINGE BENEFITS: O.T. PREM. - STAT. HOL. - VACATION - UNIFORMS - OTHER Med-Hosp. SICK Pension SOC. SEC.	Time off in lieu of O.T. 9 1 wk., 2 wks-5yrs, 3 wks-10yrs, 4 wks-15yrs City pays one-half \$1.35/wk/man - doesn't cover it all 1 day/mo. Pending (take 5% by man 2x by city Retire at 60 yrs.) Pd. in full by city.	NO. OVERTIME (ADJ. OVERTIME) 6 2 wks. NOT Supplied NONE 1 wk./yr. - Build up to 3 wks. NONE Pay 1/2 of Soc. Sec.
STAFF DUTIES OUTSIDE ASSIST. ELECT. MECHANICAL GROUNDS SLUDGE OTHER REPORTS - ANNUAL MONTHLY OR WEEKLY TO WHOM SEWER MAINT.	Contracted out — — — Help is available from Water or Street Dept. Brief one to Dept. Hd. ONE TO MICH. Bd. of HEALTH No - but do help periodically	ELECT. HIRED FOR ALL ELECT. — — — SLUDGE REMOVED FROM DRYING BEDS WITH TOWN HELP — TO MICH. Bd. of HEALTH No - May help periodically
SAMPLING & LAB - WHERE - COMPOSITES - LAB TESTS	Raw, P.E., F.E., R.S.L., D.S.L., Mix. Lia. Raw & Final (24 hr. - Autom. Sample) P.E. 8 hr man. comp. B.O.D. SS. } daily Cl ₂ R. - 2ld M.L., R. Sludge, Sd/wk. Bacti-3/wk DO. VOL. SOLIDS 1/wk. VOL. ACIDS	R, P.E., F.E., SUPERNATANT, VOL. SOLIDS 8 hr. Comp 3 days/wk. B.O.P. Cl ₂ Res. daily SS. 1.0 ppm. SETTL. SOLIDS, % SOLIDS PH
MISCELLANEOUS - INS. COVERAGE - TAXES - RESERVE OR DEP. - OPER. COSTS	ALL RISK. WAT. & SEWAGE DEPT. Budget for plant OPERATOR may purchase up to \$25. PD. Through Dept. Hd. & Council for remainder. NEW PLANT	\$500 incl. wages, supplies, fuel.
REMARKS	Have 1 pick up truck. 1-Rotary push mower 2-AUTOMATIC samplers	Operator orders own supplies must stay within budget BursPd. By Town Council by cheque. Op. has about \$2100 to spend.

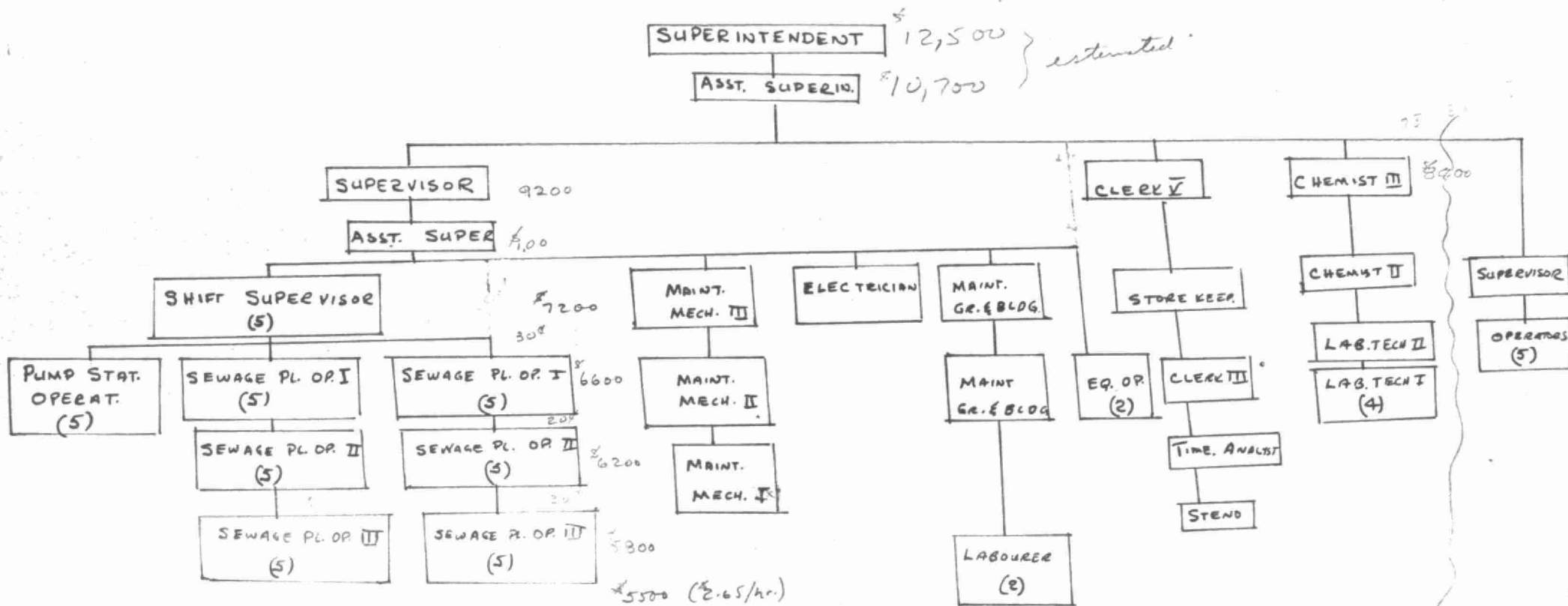
PLANT SURVEY MICHIGAN

MARCH 1965

P1

PROJECT	WYANDOTTE	TRENTON
TYPE	Primary	Primary
DESIGN FLOW	52 MGD (Pumping 162 MGD)	1.86 MGD NOMINAL, 2.67 MGD MAX.
ACTUAL FLOW	32 MGD	3.3 MGD
SIZE OF GRDS.	15 Acres (grossed)	2 Acres (grassed)
NO. OF BLDGS.	3 - Similar to Kitchener, Hamilton	2 - Similar to Belleville only a little smaller
TREATMENT UNITS.		
OFF SITE P.S.(s)	-	6 pumping station (operated by others)
ON SITE P.S.(s)	1 with 162 MGD capacity (6 pumps)	Yes
PRIM. CLARIFIERS	5 tanks 52 MGD	4 Rectangular
MECH. AERATION	-	-
DIFF. AIR	-	-
TYPE OF PROC.	-	-
DIGESTERS P.	-	-
S.	-	-
VAC. FILTER	1 K.S. 500 ft ²	2 - Filtrate Engineering 150 ft ² cloth
SLUDGE INC.	1 90 TON/DAY AND 1 135 TON/DAY	1-unit, burns garbage (by others)
HAULAGE	Raw SLUDGE HAULED FROM other plants	Ash hauled to land fill site
OTHER SLUDGE	Sludge storage with thickening	(by others)
FACILITIES	equipment 0.5 MG - Ash lagoons	Sludge storage with thickening
REMARKS	Very Housekeeping average. 4 other plants throughout system maintained by staff	devices. Housekeeping average to below. Very well equipped lab.
STAFF - NO. OF MEN	51 At Wyandotte, 6 men for others	3 For the plant 4 for incinerator
HRS. SUPER.	24 at Wyandotte	8 hrs. 7 days per week
SHIFT SCHEDULE	3 shift and a day shift of maintenance and supervisory staff.	1 shift.
NO. OP. /SHIFT A	3 - class 19	1 on weekends and Mon. 2 Remainder
A.	8	-
N.	8	-
QUALIFICATIONS	3 Class A 5 Class C Maintenance men etc.	Chief Class B
ORGANIZATION & SALARIES	See back.	<pre> graph TD Council[COUNCIL] --> SupSew[7755 SUPERINTENDENT SEWAGE PLANT] Council --> SupInc[1000 SUPERINTENDENT INCINERATORS] SupSew --> Op1[6650 91. Operator] SupSew --> Op2[46 Operator] SupInc --> Op3[Operator (3) 860] </pre> <p style="text-align: right;">(see over)</p>

PROJECT	WYANDOTTE	TRENTON
FRINGE BENEFITS: O.T. PREM. - STAT. HOL. - VACATION - UNIFORMS - OTHER Hosp & Med. Sick Leave Pension Life Ins.	Over 40 hrs or 8 hrs. - 1 1/2 Over 7 days - 2 10 to 13 (depending upon election) 1 day per mo. by 20 yrs. 4 wks. Supplied Pd. in full - \$280 /yr./men 1 day/mo. If not over 5 get 3 vac. yes 1/2 in pay when leave. Prem. for \$3000 pd. More avail. at employees exp.	Supt. Sal. Men 1 1/2 (Meal if over 2 hr.) 2x over 7 days. Minus 1 hr. (Meal if over 6 hrs) B 1-5 yrs 2 wks. Over 5 yrs. 3 wks. Supplied Pd. in full - \$280/yr./men 1 day/mo. 1/2 Sick in pay at term. 3% of pay - if over \$2800 get 5% \$3000 - 1/2 premium pd. by munic.
STAFF DUTIES OUTSIDE ASSIST. ELECT. MECHANICAL GROUNDS SLUDGE OTHER REPORTS - ANNUAL MONTHLY OR WEEKLY TO WHOM SEWER MAINT.	NIL Prepared by Supt. (Tabular) Prepared by Supt Wayne County Rd Comm. and Michigan Bd. Health Nominal - Interceptor Sewers.	Electrician obtained part time NIL Hauled by pl. staff. Prepared by Supt. (tabular) " " " " Michigan Bd. Health and Consulting Eng. NIL
SAMPLING & LAB - WHERE - COMPOSITES - LAB TESTS	Raw R.S. Filtrate Final V.F.C. 24 hour and if possible 3 8 hr. 7 days /wk. B.O.D. S.S. Bacti PH SLUDGE SOLIDS SOLIDS VOLATILE } Performed daily Special samples for Ind. Wastes. (Periodic)	Raw R.S. Filtrate Final V.F.C. 12 hour 6 days /wk. (prop. to flow) Bacti samples 3 /wk. (May to Sept) B.O.D. S.S. Bacti. and chl demand PH Sludge solids Solids Volatile Specials - cyanide - chrome - grease
MISCELLANEOUS - INS. COVERAGE - TAXES - RESERVE OR DEP. - OPER. COSTS	 Surplus operating money into Fund at present about \$500,000	Yes Considering it. Not settled - plant 1 yr. old.
REMARKS	- All purchasing by P.O. Through H.O. - Mileage for private cars - 2 pickup trucks - 2 Sludge trucks - welding equip.	- All purchasing by P.O. through H.O. - .265 KW/mg US. = .318



SALARY AS A % OF SUPER'S (ESTIMATED)

SUPERINTENDENT	100%
ASST SUPER.	86%
CHEMIST III	67%
SUPERVISOR	74%
SHIFT SUPERVISOR	57%
PL. OPERATOR II	53%
PL. OPERATOR III	46%
LABOURER	44%

PLANT SURVEY

MICHIGAN

MARCH 1965

PI

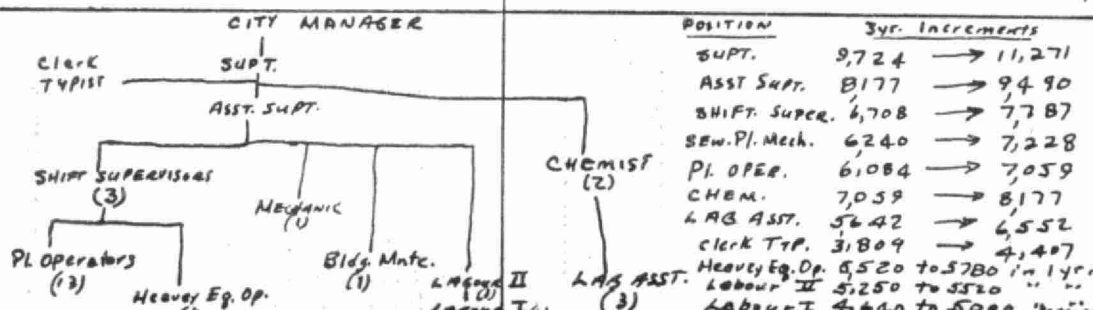
PROJECT	AUBURN	PONTIAC	EAST BLUD.
TYPE	A.S.		A.S.
DESIGN FLOW	8.34 MGD Ave. 16.7 MGD max.		7.84 MGD Ave. 11.6 MGD max.
ACTUAL FLOW	6.2 mgpd		6.2 mgpd
SIZE OF GENOS.	20 acres	Smaller than Braftford	15 acres
NO. OF BLDGS.	3 main Bldg	Longer than Braft	60% of size of Auburn
TREATMENT UNITS.			
OFF SITE P.S.(S)	—		—
ON SITE P.S.(S)	—		—
PRIM. CLARIFIERS	2 - 80' Ø		1 - 100' Ø
MECH. AERATION	Turbine 4 tanks (6.5 hrs.)		4 tanks (4.65 hrs.)
DIFF. AIR	Sparjer ring		
TYPE OF PROC.	Conventional		Conventional
DIGESTERS P.	1 - 70' Ø		1 - 75' Ø
S.	1 - 70' Ø		1 - 75' Ø
VAC. FILTER	2 - Dorr Cloth 380 St ²		
SLUDGE INC.	1 - 22' Ø 7' earth 12000 ⁺ cokes/hr.		
HAULAGE	Ash pumped to 884		Sludge pumped from
OTHER SLUDGE	Lagoon		East blud. plant to
FACILITIES			Auburn plant.
REMARKS	Sludge beds for emergencies		

STAFF - NO. OF MEN	32	
HRS. SUPER.	24	
SHIFT SCHEDULE		Same staff operates both plants

No. Op. /SHIFT A	19	
A.	4	
N.	4	

QUALIFICATIONS	Supt. Class A (required) Asst. Supt. Class A (not req'd)	
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ORGANIZATION & SALARIES



PROJECT	AUBURN	PONTIAC EAST BLVD																		
RINGE BENEFITS: O.T. PREM. - STAT. HOL. - VACATION - UNIFORMS - OTHER MED & Hosp Life ins. Social Sec. Pension	1 1/2 x over 8 hrs or 40 hrs. 9 10 days, 5 yrs - 15 days, 10 yrs - 20 days DO Pd. in full \$280/man/yr Premium above 50¢/mo/1000 pd Pd. in full 3% by employee, 3% by city																			
STAFF DUTIES OUTSIDE ASSIST. ELEC. MECHANICAL GROUNDS SLUDGE OTHER REPORTS: ANNUAL MONTHLY OR WEEKLY TO WHOM SEWER MAINT.	City electricians - pd NIL NIL NIL Condense Monthly To Mich. Bd. Health. Annual to City Manager to Council Monthly to M. Bd. of H. NIL	br sewage pl.																		
SAMPLING & LAB - WHERE - COMPOSITES - LAB TESTS	Raw, Prim., Est., Mixed Liquor, Raw Sludge, Digested, V.F. cake, Supernatant Industrial sewers (A) All are 24 hr. comp., prop. to flow were applicable <table border="1"> <thead> <tr> <th>Raw</th> <th>Final & Prim</th> <th>SLUDGE</th> </tr> </thead> <tbody> <tr> <td>BOD</td> <td>BOD</td> <td>TOTAL S.</td> </tr> <tr> <td>SS.</td> <td>SS</td> <td>PH</td> </tr> <tr> <td>Chrom.</td> <td>D.O.</td> <td>Volatiles</td> </tr> <tr> <td>Cyanide</td> <td>(clz)</td> <td></td> </tr> <tr> <td>D.O.</td> <td>Every hr. Maint. 1.0 ppm</td> <td></td> </tr> </tbody> </table>	Raw	Final & Prim	SLUDGE	BOD	BOD	TOTAL S.	SS.	SS	PH	Chrom.	D.O.	Volatiles	Cyanide	(clz)		D.O.	Every hr. Maint. 1.0 ppm		Responsible for policing industrial discharges (plating wastes) Use - 8 automatic samplers. - Automatic on plant effluent USE 120 T clz./yr.
Raw	Final & Prim	SLUDGE																		
BOD	BOD	TOTAL S.																		
SS.	SS	PH																		
Chrom.	D.O.	Volatiles																		
Cyanide	(clz)																			
D.O.	Every hr. Maint. 1.0 ppm																			
MISCELLANEOUS - INS. COVERAGE - TAXES - RESERVE OR DEP. - OPER. COSTS	Yes, in Op Budget NIL Use surplus for this \$378,000/yr including 15,000 for billing & 20,000 for purchasing and other supporting Dept.	EQUIPMENT 4 - 1/2 T pickups 1 - Small Tractor 1 - Car 3 - 20" Rotary Mower @ \$50 1 - 3/4 T pickup 1 - ARC WELDER 1 - Tractor with 1 - ACETYLENE Front End loader WELDER and BLADE & Mower (cut)																		
REMARKS	\$20 petty cash for items up to \$10 Confirming P.O. up to several \$100																			

PONTIAC SALARIES AS A % OF SUPERINTENDENTS

SALARY

<u>TITLE</u>	<u>MINM</u>	<u>MAXM</u>
SUPERINTENDENT	100%	100%
ASST SUPERI	84%	84%
SHIFT SUPERVISOR	69%	69%
SEW. PL. MECHANIC	64%	64%
PL. OPERATOR	63%	63%
CHEMIST	72%	72%
LAB ASST	58%	58%
CLERK. TYPIST	39%	39%
HEAVEY EG OP.	57%	51%
LABOURER II	54%	49%
LABOURER I	48%	44%

PLANT SURVEY MICHIGAN

MARCH 1965

P1

PROJECT	PORT HURON	
TYPE	PRIMARY	
DESIGN FLOW	11.2 MGD Ave. , 25 MGD max.	
ACTUAL FLOW	10 MGD	
SIZE OF GRNOS.	2 acres	
NO. OF BLDGS.	P.T. enclosed bigger than S.S.M.	
TREATMENT UNITS.		
OFF SITE P.S.(S)	11 (3 large \approx 12 mgd , underground)	
ON SITE P.S.(S)	21 mgd pumping to at plant	
PRIM. CLARIFIERS	8 - 16' x 100'	
MECH. AERATION	—	
DIFF. AIR	—	
TYPE OF PROC.	—	
DIGESTERS P.	4. single stage	
S.	—	
VAC. FILTER	1 - 276 ft ² Eimeo, POLYETHYLENE Cloth	
SLUDGE INC.	—	
HAULAGE	Pl. staff haul with Pl. trucks	
OTHER SLUDGE	Sludge drying beds - underground	
FACILITIES	All digest sludge to sand beds	
REMARKS	IF Beds full would use filter Have grease & oil problem - clean digesters every 2 to 3 years. Bigger than S.S. Marie	
STAFF - NO. OF MEN	13 men plus 1/2 Supt.	
HRS. SUPER.	24 hrs. , 7 days /wk.	
SHIFT SCHEDULE		
No. Op. /SHIFT A	1 man Sat & Sun.	
A.	1 - man from 5pm to 8pm	
N.	1 - man from 4:30 am - 7 am.	
QUALIFICATIONS	Class A	
ORGANIZATION & SALARIES	<pre> graph TD Supt["SUPT. (OF WATER & SEWER)"] --> Super["SUPER. SEWAGE"] Super --> Oper["OPERATOR (4)"] Super --> Clerk["CLERK LAB. II (2)"] Super --> LabI["LAB. I (2)"] Oper --> Pmt["Pmt. (1)"] Clerk --> Mech["ONE WORKS BS MTE. MECH."] </pre> <p>Salaries listed next to positions:</p> <ul style="list-style-type: none"> SUPT. (OF WATER & SEWER) \$9,000 SUPER. SEWAGE \$6,700 OPERATOR (4) \$5,500 CLERK LAB. II (2) \$5,350 LAB. I (2) \$5,000 LAB. I (2) \$4,600 ONE WORKS BS MTE. MECH. (see over) 	

PORT HURON SALARIES

<u>TITLE</u>	<u>SALARY</u>	<u>% OF SUPERT SALARY</u>	
		<u>MIN</u>	<u>MAX</u>
SUPT. (WATER & SEW.)	\$9000	100%	
SUPERVISOR (SEWAGE)	\$6700	74%	
OPERATORS	\$5500	61%	
P. STAT. & Mnte. Op.	\$5350	60%	
CLERK	\$5000	55%	
LABOURER II	\$5000	55%	
LABOURER I	\$4600	51%	

PLANT SURVEY

MICHIGAN

MARCH 1965

PI

PROJECT	ANN ARBOR	JACKSON
TYPE DESIGN FLOW ACTUAL FLOW SIZE OF GRDS. NO. OF BLDGS.	Activated Sludge 12.5 MGD Nominal - 23 MGD Maxm 8.3 MGD 15 Acres of grass (75 ^{acres} acres of prop) 4 Main ones (A little more than ^{Kitchener} Brantford)	ACTIVATED SLUDGE 15.8 MGD AVE, 41.5 PARTIAL TREAT 8.34 MGD 55 acres Brantford without V.F. Bldg.
TREATMENT UNITS. OFF SITE P.S.(S) ON SITE P.S.(S) PRIM. CLARIFIERS MECH. AERATION DIFF. AIR TYPE OF PROC. DIGESTERS P. S. VAC. FILTER SLUDGE INC. HAULAGE OTHER SLUDGE FACILITIES REMARKS	1 - 2 mgd and 1 - 1/2 mgd Nil 8 old + 4 new st. line — Sparger Step aeration 2 - Primary 4 - Secondary (operated alternately) 2 - belt 200ft ² , 2 - K.S. 376ft ² 1 - 14ft and 1 - 16ft. No Ash piped to low areas A little larger than Kitchener but close.	15 Diversion Chambers 7 (27mgd, 5mgd, 2mgd, 2mgd, 1mgd, 3mgd) 2 (One for bypassing operation) 2 units with 3 tanks each (@ 5mg - 42 mg) 4 Total vol 8.75 mgd Eimco non clog Conventional similar to Sparger 2 2 and 2 Tertiary — — Sand dried by prison inmates and truck(?) operated by plant staff Loaded by hand. Very well Kept Plant (in a park-note)
STAFF - NO. OF MEN HRS. SUPER. SHIFT SCHEDULE	25 24 hours Filter operated 6 days per week 24 hrs./day to suite Incinerator operation.	11 24 hours 1 man on aft. and night shifts
No. Op. /SHIFT A A. N.	9 (at present 8) Sat & Sun. 1 3 (at present 2) Sat & Sun. 1 3 (" " " " " " " " 1	7 1 1
QUALIFICATIONS	Supt. Class A Asst. Supt. Class A Chief Op. Class B	Supt Class A (Required) Asst Supt. " (not reqd)
ORGANIZATION & SALARIES	<pre> graph TD DUC[D.U.C.] --> Supt[SUPT.] Supt --> AsstSur[Asst. Sur.] AsstSur --> MasterMech[Master Mechanic] AsstSur --> ChiefOp[Chief Op.] AsstSur --> ForemanInc[Foreman Incinerator] AsstSur --> Chemist[Chemist] ChiefOp --> SeniorShiftOp[Senior Shift Op. (5)] SeniorShiftOp --> Labourer[Labourer (4)] SeniorShiftOp --> JolmerPumpOp[Jolmer Pump Op. (5)] ForemanInc --> Operator[Operator (4)] Operator --> Helper[Helper] Chemist --> [] </pre> <p>Salaries: Supt. \$12,194 Asst. Sur. \$10,036 Master Mechanic \$7,200 Chief Op. \$6,785 Senior Shift Op. (5) \$5,876 Labourer (4) Jolmer Pump Op. (5) Operator (4) Helper (see over)</p>	<pre> graph TD CM[CITY MANAGER] --> Supt[SUPT.] Supt --> AsstSupt[Asst. Supt.] AsstSupt --> SenMateMech[SEN. MATE MECH.] AsstSupt --> ShiftOp[SHIFT OP. (4)] AsstSupt --> MateMech[MATE. MECH.] AsstSupt --> Chem[CHEM.] AsstSupt --> Freeman[FREEMAN] AsstSupt --> TruckDriver[TRUCK DRIVER] </pre> <p>Salaries: City Manager \$11,208 Supt \$7,897 Asst Supt \$7,216 Sen. Mate Mech. \$6,800 Shift Op. (4) \$6,595 Mate. Mech. \$6,300 Freeman Truck Driver \$6,000 (see over 2)</p>

PROJECT	Ann Arbor	JACKSON
FRINGE BENEFITS: O.T. PREM. - STAT. HOL. - VACATION - UNIFORMS - OTHER Hosp. & Med. Sick leave Pension Pension	Salaried get st time off or pay 1 day/wk. 15 days in 10 yr. 18 d. in 15 yr. Supplied P'd. in full 1 day/mo. to 120 days 1/3 in pay when retired and 1/3 each yr. for that over 120 days. Based on highest 5 yrs.	St. Time off (pay if necessary) 6 2 wks, 3 wks off. 15 yrs. Supplied P'd. in full \$110/mo./yr. 1 day/mo. unlimited, no payment on termination. 5 highest Soc. Sec. 1/2 P'd. Emp. 3% on 1st \$4200, 5% on rem., City 2%
STAFF DUTIES OUTSIDE ASSIST. ELEC. MECHANICAL GROUNDS SLUDGE OTHER REPORTS: ANNUAL MONTHLY OR WEEKLY TO WHOM SEWER MAINT.	NIL " " " " NIL Tabular Michigan Bd. of Health and plant NIL	Part of life ins. NIL NIL Prison farm workers under direction of plant Foreman for grass and sludge. All sludge to prison farm. YES Tabular Michigan Bd. of H. - City Manager gets annual as well as do others. - Maintain no sewers except for diversion chambers (1 per wk)
SAMPLING & LAB - WHERE - COMPOSITES - LAB TESTS	Row Sludge - Row Primary - Digested Final - Cake, Filtrate 24 hr. @ hr. aliquot for all except Row Sludge and Bacti grabs S.S. Digest. Sl. - Daily BOD } Daily V.F. - Daily Volatile } Bacti C.O.D. Centrifuge & MLSS	6 DAYS/100 S.S., BOD, D.O. on R.S., P.E. & F.E. and pH, Cyanide, Chrome, & K. of R.S. ALL Daily. (24 hr) Supernatant - BOD, ALK, SS. SLUDGES - Solids, volatile, (Nitr.) special ALK, pH, sp. gr. GDS - CO ₂ / ALL DAILY Cl ₂ residual every 4 hrs. as long as a trace approx. Bacti by City lab. aim for less than 5000 CFU/g Time.
MISCELLANEOUS - INS. COVERAGE - TAXES - RESERVE OR DEP. - OPER. COSTS	\$10,000 for dam \$10,000 for sewers 30,000 for billing Mach. 40,000 \$45,000 including above (\$270,000 for op.)	20,000 included in op. cost. \$147,000
REMARKS	- Purchases by P.O. - Supt. up to 1000 by confirming - 1 dump truck, 1/2 Ton, stat. wdg. welder - 40 in. riding mower (1800)	Farm tractor 790 inch mower 8-hand mowers 2-Dump trucks 2-Pickups

ANN ARBOR S.T.P. - SALARY SCHEDULE

TITLE	SALARY RANGE	LENGTH OF SERVICE				% OF SUPE SAL	
		4 STEPS	7 yrs.	12 yrs.	18 yrs.	25 yrs.	Min. Max.
Superintendent	8,658 - 10,036		10,530	11,036	11,622	12,194	100 100
Asst. Supt.	7,488 - 8,658		9,100	9,568	10,036	—	86.5 82.5
Chemist	5,590 - 6,474		6,855	7,124	7,488	—	65 61.5
Chief Op.	"		"	"	"	—	" "
Inc. Foreman	"		"	"	"	—	" "
Senior Shift Op.	5,070 - 5,876		—	—	6,785	—	58.5 55.5
Inc. Op.	"		—	—	"	—	" "
Junior pump op.	4,368 - 5,070		—	—	5,876	—	50.5 48.3
			5yr.	10yr	16yr		
Master Mech.	6,150 - 6,474		6,855 7,124	7,124 7,468	7,488 7,850		71 61.5
Labourer	4,370 - 4,600		4,830	5,070	5,320		50.5 43.6

JACKSON - S.T.P. SALARY SCHEDULE

GRADE	POSITION	SALARY RANGE & steps (5%)	LONGEVITY	RATE (2 1/2%) ^{in future}			% OF SUP. SALARY	
				6 yr.	12 yr.	20 yr.	MIN.	MAX.
14	Truck Driver	4500, 4630, 4960, 5200	5,480	5,680	6,000		54	54
15	Foreman	4630, 4960, 5200, 5480	5,680	6,000	6,300		56	56
16	Maste. Mech.	4960, 5200, 5480, 5680	6,000	6,300	6,595		60	59
17	Shift. Op.	5200, 5480, 5680, 6000	6,300	6,595	6,690		63	60
18	Sen. Mnte. Mech.	5480, 5680, 6000, 6300	6,595	6,690	7,006		66	63
18	Chemist	" " " "	"	"	"		66	63
20	Asst. Sup.	6000, 6300, 6595, 6690	7,006	7,322	7,667		73	68
27	Supt.	8270, 8700, 9,150, 9,610	10,150	10,600	11,208		100	100

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